

Acceptance and Adoption of IPM in Ontario Apple Orchards—A Success Story

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Integrated pest management (IPM) is a multidisciplinary approach to managing agricultural pests in a manner which is environmentally sustainable and economically viable. IPM integrates cultural, biological and chemical controls with a thorough knowledge, understanding and use of:

- pest biology and behavior
- monitoring techniques
- economic (action, spray) thresholds
- use and timing of appropriate management tools
- record keeping
- resistance management strategies

For Ontario apple growers IPM has become an important tool to assist them in their day-to-day operations as well as long-term orchard management and planning. Practicing IPM allows growers to realize that their goal need not be to eradicate pests (the old belief of “the only good pest is a dead pest”) but simply to maintain pest populations below economically damaging levels.

Another important concept in the adoption and use of IPM is that many of the benefits derived are long term and are often difficult to quantify. For example, delaying resistance of a pest by following sound resistance management strategies can save the grower thousands of dollars over many years. Similarly the judicious use of well-timed controls can result in the gradual build-up of natural enemies over several seasons, further reducing the need for chemical control.

Finally, and perhaps most significantly, IPM is a philosophy. It is a way of think-

ing that allows growers, consultants, extensionists and others to view orchard production as both agriculturally sustainable and environmentally responsible while remaining economically viable. It represents to the individual practicing it an appreciation and deep respect for the lifestyle of farming, other living organisms, the environment and the consumer who buys the fruits of the growers' labor.

DEVELOPMENT OF IPM IN ONTARIO'S APPLE ORCHARDS

In 1969 a pilot project for monitoring apple pests was initiated in the Georgian Bay area by Agriculture Canada. The program was commercially implemented by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), and by the early 1980s most apple growing regions had access to pest monitoring information. Benefits were obtained by growers primarily by reducing the number of pesticide applications and timing sprays for more effective pest control.

Today, OMAFRA continues to use representative “regional” orchard sites to obtain information for updating regular agriphone messages. The agriphone, accessible to apple growers during the growing season, is a voice message with a 2- to 3-minute update outlining current pest activity and IPM compatible control strategies.

In 1999 apple growers in this province have available to them a new publication entitled Integrated Pest Management for Ontario Apple Orchards (Solymar et al., 1999). This comprehensive manual de-

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scribes biology, monitoring, economic thresholds and management options for all apple pests including insects, mites, plant diseases, weeds, nematodes and vertebrates. Through a provincial grant every apple grower in Ontario will receive a free copy of this manual. Additional information is supplied by OMAFRA via newsletters, information meetings, pest management workshops and local apple study groups.

Apple growers in Ontario have largely embraced the basic principles of IPM. Some have taken a further step in forming grower-funded IPM groups in which participating growers hire their own pest management scout(s) or consultants. These trained individuals monitor each orchard for a number of pests and report directly back to individual growers. Growers then use this information along with their knowledge of IPM (i.e., pest biology and behavior, thresholds) to make management decisions on whether to respond and treat the problem.

A recent study conducted by the Ministry of Agriculture, Food and Rural Affairs compared different pest management programs used by Ontario apple growers (Solymar, unpubl.). The following measures of IPM adoption were compared: the number of and actual costs of sprays applied and the environmental impact of these programs using Environmental Impact Quotients (EIQ), a pesticides impact model introduced by Cornell University researchers (Kovach et al., 1992). The EIQ and EIQ Field Use Ratings were developed based on extensive data bases including EXTONET, PESTICIDE MANAGEMENT and EDUCATION, CHEM-NEWS, SELCTV, the National Pesticide/Soils Data-

base (developed by the USDA Agricultural Research Service and Soil Conservation Service) and numerous Material Safety Data Sheets (MSDS). Using this system, each pesticide is rated according to its impact on potential farm worker and consumer health and on negative environmental impacts. Summing the EIQ Field Use Ratings allows for the use of individual pesticides in the comparison of different orchard spray programs.

In the Ontario study the following programs were compared:

Calendar Spray Program

This scenario involves a program in which a grower applies a fungicide and in-

secticide every 10-14 days regardless of whether they are needed or not. This was the norm prior to the implementation of the Ontario apple IPM program in the early 1980s.

Regional Pest Management Program

In this program a number of representative orchards in each apple growing area are monitored by scouts hired by the Ministry of Agriculture, Food and Rural Affairs. Pheromone traps, visual lures and leaf counts are used, along with computerized day degree models and disease forecasting models to recommend timing of sprays. Updates on pest activity and spray timings are available to growers via an "agri-iphone" answering machine updated 3 times per week. Some selective insecticides are favored. Currently, an estimated 99% of Ontario apple growers have access to regional agri-iphones.

Grower-Funded IPM Program

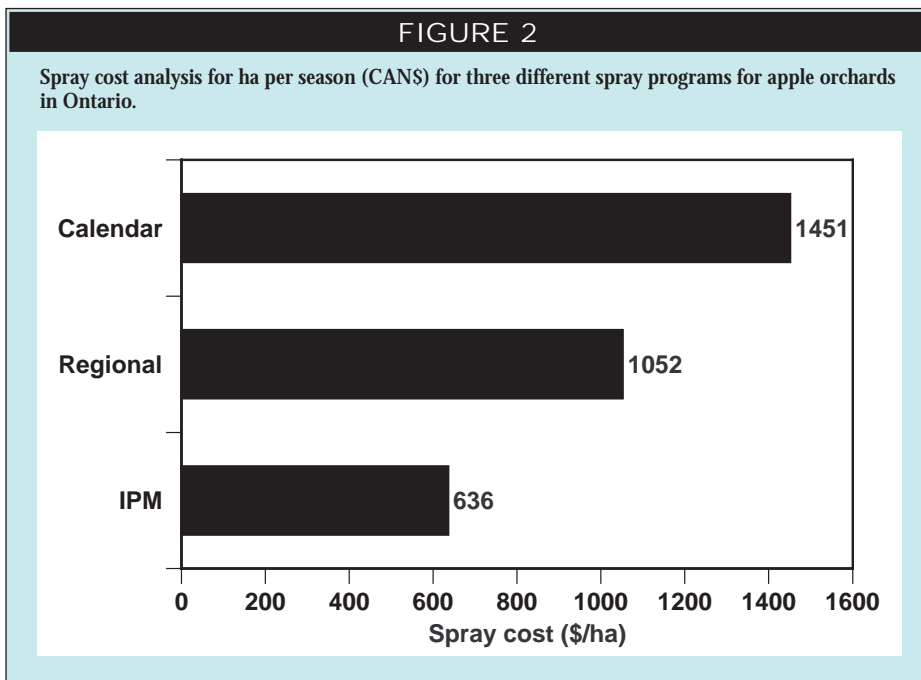
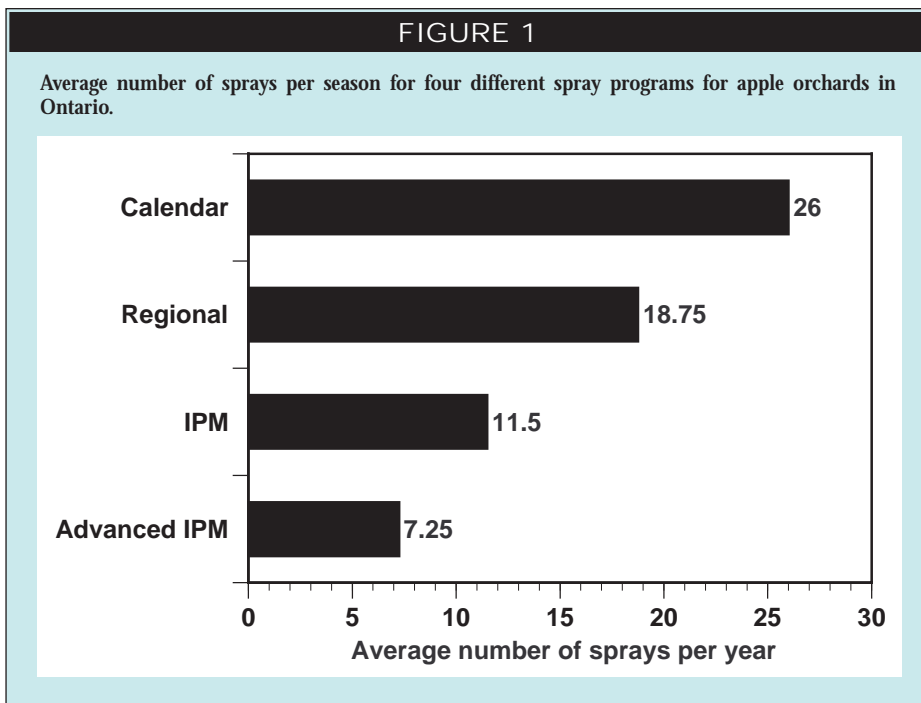
In this system a group of growers hires its own IPM scout or consultant. The scout or consultant monitors and reports back to individual growers in the program on a weekly basis. Site-specific pests such as tentiform leafminer, mullein bug and mites are closely monitored. Participating growers are generally familiar with IPM practices through courses, workshops or study groups. Selective pesticides are favored over disruptive, excessively toxic, or broad-spectrum pesticides. (Approximately 35% of Ontario's apple acreage is now on such a program.)

Advanced IPM Program

This is a program based on a probable orchardist's IPM program in years to come. In this scenario, all orchards are grown at a density of 1480 trees/ha or more (600 or more trees/acre) on dwarfing rootstocks, tree row volume spraying is individually calculated for each orchard block and "biorational" products such as insect growth regulators (IGRs) are registered to replace most broad spectrum pesticides currently in use. Intensive whole orchard monitoring and widespread use of biological control agents are standard.

The average number of sprays used per season varies with the program (Figure 1). The calendar spray program had the highest number of sprays and the advanced program had the least.

The spray cost analysis (Figure 2) followed the same basic pattern with calendar sprays being the most expensive and IPM



programs being the least expensive. Note that no dollar calculations were made for the advanced IPM since the cost of materials was not available.

Finally, Figure 3 illustrates the “theoretical” environmental impacts of the four different programs. The actual values calculated for each program are not important, it is the comparison of values between programs that is important. The relationship between the first three programs illustrates that Ontario orchardists using IPM have significantly lowered the environmental impact of agricultural chemicals applied to their apple orchards.

Based on the above model, in the future the environmental impacts of apple orcharding could be reduced to roughly one quarter of current IPM programs as indicated by the advanced IPM scenario. This also clearly indicates that the trend to-

ward increasing tree densities and dwarfing rootstocks not only makes good economic sense but is a more environmentally sustainable way of orcharding as well.

Unfortunately, in spite of the success of IPM as an ongoing process in Canadian apple production, there are still some major roadblocks to the further development and adoption of more sustainable technologies. As the industry moves away from the more broad spectrum pesticides there is greater interest in newer chemistries which are often less toxic, more IPM compatible and friendlier to the environment. However, because of the registration process in Canada, the industry often does not get access to new chemistries as soon as other countries and therefore remains at a competitive disadvantage, particularly to our major competitors to the south. This became very ev-

ident to the first author when attending an international IPM workshop in Switzerland in July 1998.

THE IPM CONTINUUM

The development and level of adoption of Integrated Pest Management on farms are ongoing processes. Apple growers in Ontario continuously seek to improve their IPM program in an attempt to make it more environmentally sustainable. As well, many orchardists are finding that IPM can benefit them in other ways, such as improving the public’s perception of farming and the use of IPM as a marketing tool.

The following outlines stages through which an apple grower can progress as he/she follows the IPM continuum, Table 1.

FORMING A GROWER-FUNDED IPM GROUP

In Ontario, growers in some apple growing regions have formed intensive or grower-funded IPM groups. These grower groups hire pest management scouts (or consultants) to monitor their orchards on a weekly basis in order to stay current and to respond in a timely manner to potential pest problems. Growers on such a program also benefit by being able to fine-tune their IPM programs beyond just local agriphone recommendations. Since some pests can be a problem in some orchard blocks and not others, growers can focus their efforts on managing these “hot spots” in their orchards. Knowing what the pest situation is at all times also allows “preventive” management rather than “reactive” management. In summary, a grower-funded program allows a more environmentally sustainable approach to managing pests, can potentially save the grower hundreds of dollars in pesticide application costs and gives peace of mind knowing the pest situation in one’s orchard at all times. In 1999, over 50% of the apple acreage in Ontario will be on such a program.

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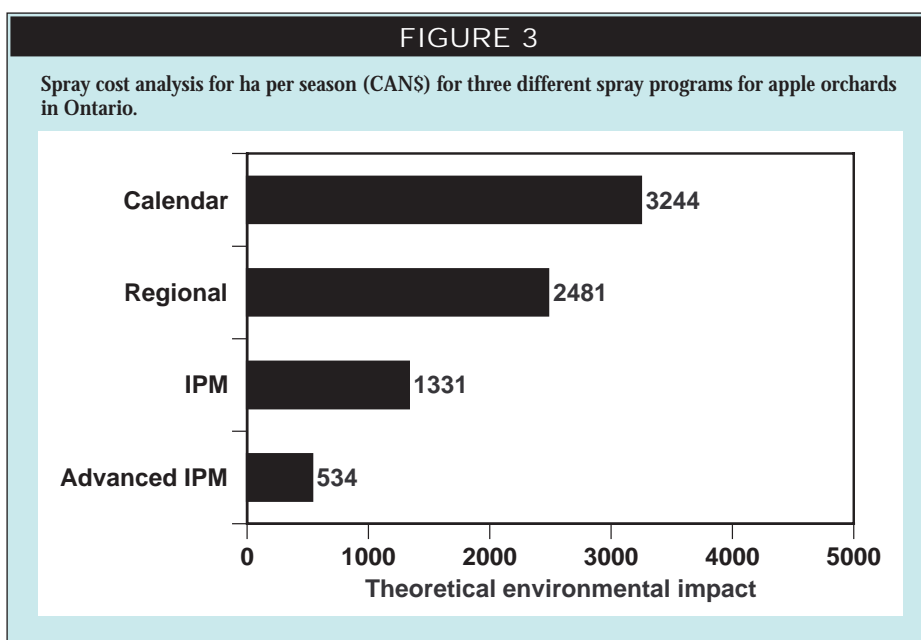


TABLE 1

Stage	Program	Decision Making Resources
1	Calendar Spraying	● Publication 360 (Anon., 1968)
2	Regional Pest Management	● Publication 360, ● IPM manual, ● regional agriphones, ● some selective pesticides used
3	Integrated Pest Management	● weekly “Representative Block” scouting ● IPM manual ● economic thresholds ● regional agriphones ● emphasis on selective pesticides and some pesticide alternatives to reduce impacts on beneficials use of resistance management strategies
4	Advanced Integrated Pest Management	● regular and frequent “Whole Farm” scouting ● IPM manual ● economic thresholds ● emphasis on pesticide alternatives and “preventive” management; use of selective pesticide as a last resort ● extensive use of resistance management strategies